

- A Low alkalinity with low turbidity.
- B Low alkalinity with moderate and high turbidity.
- C Low alkalinity with low, moderate and high turbidity.
- D Moderate and high alkalinity with moderate and high turbidity
- E Moderate and high alkalinity with low turbidity.

Figure 2

Raw Water		hanced Coagulation er Alkalinity (ppm	
TOC (ppm)	0-60	61-120	>120
>2.0-4.0	35.0%	25.0%	15.0%
>4.0-8.0	45.0%	35.0%	25.0%
>8.0	50.0%	40.0%	30.0%

Reference pp. 16 and 44 of 146 of NPDWR, and p. 2 of Publication of HDR Engineering, Inc., referred to as "HDR"

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Test Results for Water of Low alkalinity with Low Turbidity

TEST	LOCATION	DATE	CHEM/	JAR	R TEST MIXING	XING	RA	W WATE	RAW WATER SPECIFICATIONS	FICATIO	SN	FINAL		SETTLED RESULTS	LTS
			PPM	₹	IINUTES/RPM)	(PM)	ALK.	TURB.	COLOR	T0C	H	TURB.	COLOR	TOC	H
			"3"	RAPID	FLOC.	SETTLE	PPM	NTC	HACH	UV254		NTC	HACH	UV254	:
	Hot Springs, AR		CV1787						None				None		
-	(Lakeside)	04/21/99	5 ppm	3/90	15/20	15/0	18	1	Visible	¥	7.2	0.3	Visible	N/A	7.3
-	Hot Springs, AR		CV1787						None				None		
2	(Quachita)	03/31/99	6 ppm 1	1/85	8/15	30/0	20	က	Visible	Ϋ́	7.2	0.7	Visible	A/N	7.4
	Center, TX		CV1703		10/40										
3	(Mill Creek)	12/30/98	28 ppm	1/120	15/15	30/0	25	16	170	A/N	6.9	1.24	5	× ×	7.0
	Center, TX		CV1700		15/35				None				None		
4	(Pinkston)	11/12/98	8 ppm	.75/100	5/15	20/0	23	9	Visible	Ϋ́	7.4	0.3	Visible	Α N	7.8
	Longview, TX		CV1725		15/30										
5		03/30/99	8 ррт	.6/80	20/20	10/0	21	1	101	A/A	8.9	0.3	15	Α. V	2.0
	Longview, TX		CV1725		15/30										
9	(Cherokee)	01/29/99	6 ррт	.6/80	20/20	20/0	25	2	111	N/A	¥X	0.5	18²	N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/N/	N/A
			CV1703	3/50	1.5/40										
7	Marshall, TX	02/18/99	30 ppm	1/100	2/20	10/0	16	4	130	0.40	5.6	0.9	11	N/A	5.5
			CV1703	3/50	1.5/40										
8	Marshall, TX	02/18/99	19 ppm	1.5/100	5/20	20/0	16	5	80	0.29	Ϋ́	0.7	9	0.08	A/N
			CV1703	3/50	1.5/40										
6	Marshall, TX	10/02/99	55 ppm	1.5/100	5/20	20/0	8	9	230	Ϋ́	5.9	9.0	172	V.	6.2
			Alum												
		26/60/20	30 ppm	2/100	5/40	15/0	8	7	37	Y.X	ΥX	0.5	o	¥ X	¥ X
9	Marshall, TX		CV3650												
			1 ppm		5/25										•
	i		CV1710		10/60				None				None		
=	Tyler, TX	02/04/99	7 ppm	.5/100	10/25	15/0	22	က	Visible	:	9.2	0.5	Visible	***	7.6
	Nacogdoches,		CV1735	2/100	10/30										
12	ΤX	03/09/99	14 ppm	10/40	10/20	20/0	17	23	260	V V	٨	0.7	8	××××××××××××××××××××××××××××××××××××××	Ą
	Mt. Pleasant,		CV1740		2/30	٠			None				None		
13	ΤX	66/80/90	5 ppm	1/100	15/15	20/0	14	3	Visible	۷ X	6.7	4.0	Visible	٧	8.9
	Nacogdoches,		CV1735	2/100	10/30										
14	ΤX	06/22/99	7 ppm	10/40	10/20	20/0	26	4	26	ΑN	7.0	0.2	0	V.Z	7.2
•				***											

*** CV1710 obtained 47% TOC removal. Alum only obtained 19%. Best Results of dosage curve.

Anthracite filters can easily remove 5 Standard Color Units. Dosages are on a mass basis. Products are 40 to 50 percent active. For dosages on an active basis, conversions must be made.

Jar test designed to match the plant, which had VERY poor mixing. With plant modifications, operation is less than 1.0 NTU. Please refer to write up in the specification.

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Test Results for Raw Water of Low Alkalinity and Moderate to high Turbidity

TEST	LOCATION	DATE	CHEM/	JAR	JAR TEST MIXING	IIXING	8	IW WAT	RAW WATER SPECIFICATIONS	IFICATIO	SN	FINAI	SETTI ED RESIII TO	D RESI	1 70 1
			PPM "3"	RAPID	NUTES/I FLOC.	RPM) SETTLE	ALK.	TURB.	COLOR HACH	TOC UV254	H	TURB.	TURB. COLOR	TOC	H.
1	Nederland, TX	01/27/95	CV1777 66 ppm	1/120	10/30	20/0	16	73	X X	A N	6.4	80	Ø/Z	ØN.	8.7
2	Nederland, TX	01/27/95	ACH ⁴ 70 ppm	1/120	10/30	20/0	16	73	N/A	A/A	8	4 4	N/N		7 0
ဗ	Nederland, TX	01/27/95	AICIs ⁴ 70 ppm	1/120	10/30	20/0	16	73	N/A	Ą	9 9	10.24	S S	Z AN	7 0
. 4	Nederland, TX	12/22/97	CV1777 26 ppm	3/250	15/40	15/0	18	35	N/A	A/N	7.5	20.5	Z AN		7 6.7
5	Nederland, TX	09/30/98	CV1777 55 ppm	3/120	5/40	10/0	22	20	225	ξ. X	A N	0.5	<u> </u>	Q Q	0. 4
9	Nederland, TX	02/23/99	CV1777 42 ppm	3/250	5/30	15/0	11	47	150	A/A	7.0	0.9) 0	A N	7.2
. 2	Nederland, TX	06/23/99	CV1777 40 ppm PA-AA 0.2 ppm	3/215	5/35	10/0	18	31	128	N/A	6.7	0.7	7	N/A	6.8
8	Beaumont, TX	07/07/98	CV1730 18 ppm PA-AA 0.2 ppm	2/120	10/25	Filter Paper	22	32	42	N/A	6.5	0.12	2	N/A	6.6
6	Beaumont, TX	86/20/20	CV1730 90 ppm PA-AA 0.5 ppm	2/120	10/25	Filter Paper	22	32	120 Color Units Above spiked w/ Tannic Acid for capability testing	Units ked w/ id for lesting	4.3	0.12	16	NA	5.6
10	Beaumont, TX	02/11/99	CV1730 40 ppm PA-AA 0.5 ppm	2/120	10/25	Filter Paper	12	33	108	N/A	6.2	0.12	ις.	N/A	6.5
11	Port Arthur, TX	1995	Alum 24 ppm CV3650 10 ppm	1/120	15/30	20/0	20	36	N/A	N/A	N/A	9.0	None Visible	N/A	N.A
12	2 Port Arthur, TX 06/16/99	06/16/99	CV1756 19 ppm	1/120	0 15/30	20/0	21	82	N/A	N/A	6.3	6.0	None Visible	N/A	6.5

2. 40 micron filter instead of settling. Best results of dosage curve.

Dosages are on a mass basis. Products are 40 to 50 percent active. For dosages on an active basis, conversions must be made.

Single component aluminum tests for comparison. ACH was Courtney ACH @ 50% active. AICI3 was Courtney AICI3 @ 33% active.

Test Results for Raw Water of Low Alkalinity with Low to high Turbidity

Table "C"

TEST	LOCATION	DATE	CHEM/	JAR	AR TEST MIXING	IXING	æ	V WATE	RAW WATER SPECIFICATIONS	FICATION	SNC	FINAL	SETTLE	D RESUL	TS
			Mdd	₹,	(MINUTES/RPM)	RPM)	ALK.	TURB.	ALK. TURB. COLOR TOC	10 C	F	TURB.	COLOR	TURB. COLOR TOC P	H
			"2"	RAPID	-Loc.	RAPID FLOC. SETTLE	PPM	D L N	HACH	UV254		NTC	HACH	UV254	•
•			CV1788						None				None		
-	Aligore, IA	06/03/99	70 ppm	1.3/100	اء.	30/0	40	38	Visible	Ϋ́	7.1	8.0	Visible	Ϋ́	7.3
			CV1795		2/20										(
2	Shreveport, LA	10/29/98	8 ppm	1/100	20/20	30/0	4	œ	86	N/A	7.8	6.0	6	N/A	
															j
င															
4															
2			•												-
1 Bee	Bost Dogults of dogges	0,01.0						1					-		

Best Results of dosage curve.
 Dosages are on a mass basis. Products are 40 to 50 percent active. For dosages on an active basis, conversions must be made.

Test Results for Raw Water of Moderate to High Alkalinity and Moderate to high Turbidity

TEST	LOCATION	DATE	CHEM/	JAR	JAR TEST MIXING	IIXING	RA	N WATE	RAW WATER SPECIFICATIONS	FICATIC	SNO	FINAL	SETTLE	FINAL SETTLED RESULTS	TS
·			Mdd	Ξ	(MINUTES/RPM)	RPM)	ALK.		TURB. COLOR TOC	TOC	PH	TURB.	COLOR	TOC	H
			"3"	RAPID	FLOC.	PID FLOC. SETTLE	PPM	NTO	HACH	UV254		NTO	HACH		
 			CV1750		15/60		u		None				None		
-	Columbia, MO	1/18/99	2 ppm	.5/60	5/15	30/0	150	71	Visible	V V V	တ	0.7	Visible	× ×	o
			CV1740		10/30				None				None		
2	Denton, TX	06/16/99	5 ppm	2/100	5/15	10/0	120	23	Visible	¥ X	7.9	0.3	Visible	A/A	
			CV1790		2.5/70				None				None		
ဂ	Lewisville, TX	04/01/99	10 ppm	3/135	20/20	2/0	105	27	Visible	×	8.0	0.12	Visible	Ą	s C
			CV1740		12/40				None		1		A CON		;
4	Denton, TX	04/06/99	8 ppm	.1/185	45/30	13/0	110	23	Visible	0.079	7.9	0.2	Visible	0.05	8.4
			CV1790		13/40				None				None		
2	Denton, TX	03/18/99	6 ppm	.1/185	46/30	14/0	110	27	Visible	0.261	7.9	6.0	Visible	900	ď
	Ft. Worth, TX		CV1735		17/16				None				None		
9	(Rolling Hills)	02/23/99	8 ppm	2/120	17/6	20/0	81	20	4	×	8.0	6.0	Visible	A/N	CX
									٦			2.5	200		1

Best Results of dosage curve. 40 micron filter.

Dosages are on a mass basis. Products are 40 to 50 percent active. For dosages on an active basis, conversions must be made. ત. બ છ

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Test Results for Raw Water of Moderate to High Alkalinity with Low Turbidity

TEST	LOCATION	DATE	CHEM/	JAR	JAR TEST MIXING	IIXING	RA	N WATE	RAW WATER SPECIFICATIONS	FICATIO	NS	FINAL	SETTLE	FINAL SETTLED RESULTS	TS
			PPM	Ē,	(MINUTES/RPM)	RPM)	ALK.	-	TURB. COLOR TOC	TOC	표	TURB.	COLOR	10 C	PH
			"3"	RAPID	FLOC.	APID FLOC. SETTLE	Mdd	N D T N	HACH	UV254		NTC	HACH	UV254	
	TRA		CV1740		10/30				None				None		
-	Euless, TX	06/17/99	8 ppm	2/100	5/15	10/0	112	4	Visible	V	7.9	0.7	Visible	V.X	7.9
	Ft. Worth, TX		Cv1735		17/16				None				None		
2	(Rolling Hills)	03/02/99	10 ppm	2/120	17/6	12.5/0	109	16	Visible	¥,	7.8	0.7	Visible	A/A	9
•			CV1790		13/40				None				None		
က	Denton, TX	03/04/99	8 ppm	.1/185	45/30	12/0	109	15	Visible	N/A	7.8	0.3	Visible	Y.	7.9
			CV1740						None				None		
4	DC Park Cities, TX	03/29/99	12 ppm	1/100	15/25	30/0	105	16	Visible	Ϋ́	7.8	0.7	Visible	¥ X	8.0
	TRA		CV1740						None				None		
5	Euless, TX	05/28/99	10 ppm	2/120	7/20	15/0	120	4	Visible	Y.	7.8	0.3	Visible	Υ _Z	7.8
			CV1788		28/50				None			,	None		
9	Waxahachie, TX	02/16/99	10 ppm	1/250	28/30	12/0	120	6	Visible	××	7.8	0.1	Visible	V/N	7.9
	•		CV1789		15/40		u		None				None		
. 7	Columbia, MO ²	05/19/99	3.5 ppm	1/60	5/15	20/0	150	16	Visible	¥X	<u></u>	0.5	Visible	N/A	6
	BRA		CV1787						None				None		
80	Granbury, TX	02/10/99	10 ppm	1/125	39/25	15/0	105	9	Visible	Y.N	¥ X	0.7	Visible	₹ X	ĕ Z

1. Best Results of dosage curve.

This is a lime softening facility. The raw alkalinity is 200 to 350 and the raw turbidity is 1 to 3. Testing was performed on the secondary clarifier, where, the alkalinity has already been reduced.

Dosages are on a mass basis. Products are 40 to 50 percent active. For dosages on an active basis, conversions must be made.

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Test Results - Comparison Tests

	1										-	
-	6.3		5.3	7.8	Į į		0.0 N	A	Į į	Q.	5.6	9.9
80.0	0.21	0.19	0.168	Ą Z	δ/N	V V	Z AVN	N/A	A/N	V	A N	N/A
۵	× ×	13	27	None Visible	None	None	None	None	None	None Visible	None Visible	None Visible
0 7	2.4	77	2.1	1.6	0.4	0 3	3.5	1.	0.3	6.0	2.8	0.7
6.2	6.2	6.2	6.2	7.8	7.0	7.0	7.9	7.9	7.9	6.4	6.4	6.4
0.53	0.53	0.53	0.53	N/A	¥ X	A/A	W N	₹ Ž	N/A	N/A	A/A	N/A
184	184	184	184	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible	None Visible
=	17	=	11	4.0	4.0	4.0	23	23	23	77	77	77
12	12	12	12	112	112	112	120	120	120	26	26	26
30/0	30/0	30/0	30/0	10/0	10/0	10/0	10/0	10/0	10/0	10/0	10/0	10/0
0	1.5/40 15/20	1.5/40 15/20	1.5/40 15/20	10/30 5/15	10/30 5/15	10/30 5/15	10/30 5/15	10/30 5/15	10/30 5/15	10/40 5/15	10/40 5/15	10/40 5/15
	2.5/50 1.5/100	2.5/50 1.5/100	2.5/50 1.5/100	2/100	2/100	2/100	2/100	2/100	2/100	2/100	2/100	2/100
CV1703 28 ppm	CV1703 LMW DAD 32 ppm	AICI 20:1 HMW DAD 40 ppm	AICI 20:1 LMW DAD 50 ppm	PAC 50% 14 ppm	AICI ₃ 27 ppm	CV1740 10 ppm	PAC 50% 14 ppm	AICI ₃ 24 ppm	CV1740 6 ppm	PAC 50% 70 ppm	AICI ₃ 70 ppm	CV1756 24 ppm
05/14/99	05/14/99	05/14/99	05/14/99	06/17/99	06/17/99	06/17/99	06/16/99	06/16/99	06/16/99	06/16/99	06/16/99	06/16/99
Marshall, TX	Marshall, TX	Marshall, TX	Marshall, TX	TRA Euless, TX	TRA Euless, TX	TRA Euless, TX	Denton, TX	Denton, TX	Denton, TX	Pt. Arthur, TX	Pt. Arthur, TX	Pt. Arthur, TX
1	2		4	9	9		. 8	6	10	1	12	13
	CV1703 2.5/50 1.5/40 12 11 184 0.53 6.2 0.08	Marshall, TX 05/14/99 28 ppm 1.5/100 5/20 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21	Marshall, TX 05/14/99 CV1703 2.5/50 1.5/100 5/20 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 HMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 HMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 13 0.19	Marshall, TX 05/14/99 CV17/03 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMWV DAD 1.5/100 1.5/40 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 HMVV DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 2.4 34 0.19 Marshall, TX 05/14/99 HMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 13 0.19 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.1 2 0.19	Marshall, TX 05/14/99 CV1703 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 HMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 HMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 13 0.19 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.1 2 0.19 Fulsss, TX 06/17/99 PAC 50% 1.5/40 30/0 12 11 184 0.53 6.2 2.1 2 0.16 Fuless, TX <td< th=""><th>Marshall, TX 05/14/99 CV4703 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.19 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 13 0.19 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.1 2 0.168 TRA AICI 20:1 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 2.1 2 0.168 Fuless, TX 06/17/99</th><th>Marshall, TX 05/14/99 CV1703 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.19 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.19 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.1 2 0.19 Euless, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.1 2 0.168 Euless</th><th>Marshall, TX 05/14/99 CV/1703 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 19 Marshall, TX 05/14/99 LMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 19 Marshall, TX 05/14/99 LMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.16 FRA O.5/14/99</th><th>Marshall, TX 05/14/99 2.5/50 1.5/40 5/20 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LWW DAD 1.5/100 5/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 1.1 1.9 Marshall, TX 05/14/99 LMW DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 2.1 3 0.19 FIRA O6</th><th>Marshall, TX 05/14/99 CV/T/03 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 2.4 34 0.201 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 1.3 0.19 Marshall, TX 05/14/99 LMVV DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 1.1 1.0 TRA</th><th>Marshall, TX 05/14/99 CV1703 2.5/160 1.5/160 3.5/20 3.00 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.4 34 0.21 Marshall, TX 05/14/99 HMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 13 0.19 FRA ACI 20.1 2.5/10 1.5/10 15/10 15/10 15/10 10.00 1.2 1.1 184 0.53 6.2 1.1 1.9 FRA ACI 20.1 1.5/10 15/20 3.00 1.2 1.1 184 0.53 6.2 1.1 1.9 Euless, TX</th></td<> <th>Marshall, TX 05/14/99 CV47033 2.5/50 1.5/400 300 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMV DAD 1.5/100 15/20 300 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMV DAD 1.5/100 15/20 300 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMV DAD 1.5/100 15/20 300 12 11 184 0.53 6.2 2.4 34 0.21 LINA DAD 1.5/100 15/20 300 12 11 184 0.53 6.2 1.7 3 0.19 Lices, TX 05/14/99 LMW DAD 1.5/10 15/20 300 12 11 184 0.53 6.2 1.7 1.9 Lices, TX 05/14/99 LMW DAD 1.5/20</th>	Marshall, TX 05/14/99 CV4703 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.19 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 13 0.19 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.1 2 0.168 TRA AICI 20:1 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 2.1 2 0.168 Fuless, TX 06/17/99	Marshall, TX 05/14/99 CV1703 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.19 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.19 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.1 2 0.19 Euless, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.1 2 0.168 Euless	Marshall, TX 05/14/99 CV/1703 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 19 Marshall, TX 05/14/99 LMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 19 Marshall, TX 05/14/99 LMWV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.16 FRA O.5/14/99	Marshall, TX 05/14/99 2.5/50 1.5/40 5/20 30/0 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LWW DAD 1.5/100 5/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 1.1 1.9 Marshall, TX 05/14/99 LMW DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 2.1 3 0.19 FIRA O6	Marshall, TX 05/14/99 CV/T/03 2.5/50 1.5/40 30/0 12 11 184 0.53 6.2 2.4 34 0.201 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMVV DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 1.3 0.19 Marshall, TX 05/14/99 LMVV DAD 1.5/100 1.5/20 30/0 12 11 184 0.53 6.2 1.1 1.0 TRA	Marshall, TX 05/14/99 CV1703 2.5/160 1.5/160 3.5/20 3.00 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.4 34 0.21 Marshall, TX 05/14/99 HMW DAD 1.5/100 15/20 30/0 12 11 184 0.53 6.2 1.1 13 0.19 FRA ACI 20.1 2.5/10 1.5/10 15/10 15/10 15/10 10.00 1.2 1.1 184 0.53 6.2 1.1 1.9 FRA ACI 20.1 1.5/10 15/20 3.00 1.2 1.1 184 0.53 6.2 1.1 1.9 Euless, TX	Marshall, TX 05/14/99 CV47033 2.5/50 1.5/400 300 12 11 184 0.53 6.2 0.7 8 0.08 Marshall, TX 05/14/99 LMV DAD 1.5/100 15/20 300 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMV DAD 1.5/100 15/20 300 12 11 184 0.53 6.2 2.4 34 0.21 Marshall, TX 05/14/99 LMV DAD 1.5/100 15/20 300 12 11 184 0.53 6.2 2.4 34 0.21 LINA DAD 1.5/100 15/20 300 12 11 184 0.53 6.2 1.7 3 0.19 Lices, TX 05/14/99 LMW DAD 1.5/10 15/20 300 12 11 184 0.53 6.2 1.7 1.9 Lices, TX 05/14/99 LMW DAD 1.5/20

Best Results of dosage curve.

Dosages are on a mass basis. Products are 40 to 50 percent active. For dosages on an active basis, conversions must be made. Aluminum Chloride is 33% active.

Low Molecular weight DADMAC is 20% active with a viscosity of 250 CPS which correlates to a molecular weight of about 250,000. PAC is 50% active and 50% basic. **αω4.** α

FIGURE 9

Ratios of AP-AC to AmP

		RM-20	RM-21	RM-22	RM-23	RM-24		AP-AS/	AC-AS/
Product	Sg	AP	AS	M,H MW	LMW	M,HMW	H₂O	LMW	M,H,VH
				DADMAC	Epi-DMA	EPI-DMA		AmP	MW
					•				AmP
CV 1700	1.22	27/15	33/17	9/1.6	12/5.7	9/4.2	10	3	6
CV 1702	1.26	0	95/48	5/1.4	0	0	0	34	34
CV 1703	1.24	37/20	42/21	10/1.7	9/4.1	0	2	. 7	24
CV 1705	1.25	35/19	40/20	0	15/6.9	10/4.6	. 0	3	8
CV 1710	1.22	27/15	31/16	14/2.4	14/6.6	9/4.2	5	2	5
CV 1715	1.17	27/16	33/18	10/1.8	10/4.9	10/4.9	10	3	5
CV 1720	1.21	26.5/15	31.5/17	27/4.7	10/4.8	0	5	3	7
CV 1725	1.21	25/14	30/16	10/1.7	20/9.5	5/2.4	10	2	11
CV 1730	1.21	25/14	30/16	16/2.8	24/11.4	0	5	2	11
CV 1735	1.25	60/32	0 .	20/3.4	15/6.9	5/2.3	0	3	6
CV 1740	1.27	70/38	0	20/3.3	0	10/4.5	0	5	5
CV 1745	1.28	70/37	0	15/2.7	15/6.8	0	0	4	14
CV 1750	1.28	70/37	0	7.5/1.2	7.5/3.4	15/6.7	0	3	5
CV 1754	1.25	70/34	0	10/1.5	0	20/8.3	9	3	3
CV 1756	1.27	66/35	0	0	21/9.5	8/3.6	5	3	10
CV 1760	1.23	60/33	.0	40/6.8	0	0	0	5	5
(old 1777)									
CV 1770	1.23	32.5/18	37.5/19	30/5.1	0	0	0	7	7
CV 1775	1.29	75/39	0	13/2.2	12/5.4	0	0	5	18
CV 1778	1.26	60/32	0	10/1.7	30/13.7	0	0	2	19
CV 1780	1.20	50/28	0	50/8.8	0	0	0	3	3
CV 1785	1.33	90/46	0	0	7.5/3.2	2.5/1.1	0	11	42
CV 1786	1.25	50/27	0	0	30/13.8	20/9.2	0	11	3
CV 1787	1.32	85/44	0	0	0	15/6.5	0	7	7
CV 1788	1.30	80/42	0	10/1.6	10/4.4	0	0	7	26
CV 1790	1.32	85/44	0	5/0.8	0	10/4.4	0	8	8
CV 1795	1.23	45/25	0	0	32/15	13/6.1	10	1	4
CV 1798	1.34	95/48	0	5/0.8	0	0	0	60	60
			-						
CV 1901	1.31	90/46	0	6/1.8,CV5160	0	0	3	23	23
CV 1903	1.24	37/20	42/22	5/1.6,CV5180	9/4	0	4	7.5	26
CV 1995	1.20	45/25	0	5/1.7,CV5140	32/15	0	15	1.5	15
2									
CV 1170	1.30	40/21	60/29	0	0	0	0	Infinite	Infinite
CV 1180	1.16	40/23	45/25	0	10/5	0	4	10	Infinite
CV 1190	1.30	85/44	0	0	10/4.5	0	4	10	Infinite

RM-20 is CV 1100 being a 50% active 84% basic 24% measured Al₂O₃ ACH solution having a Sg of 1.35.

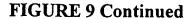
RM-21 is CV 1135 being a 10% measured Al₂O₃ AlCl₃ solution having a Sg of 1.27 and an estimated 50% activity.

RM-22 is CV 3650 being a 20% active HMW DADMAC having a Sg of 1.05 and a viscosity of 2,000 +/- 1000 cps.

RM-23 is CV 3210 being a 50% active LMW Epi-DMA having a Sg of 1.15 and a viscosity of 125 +/- 50 cps.

RM-24 is CV 3250 being a 50% active HMW Epi-DMA having a Sg of 1.15 and a viscosity of 6,000 to 11,000 cps.

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CV 5140 is a 40-mole % cationic Q-9 Polyacrylamide 40% Active Emulsion in Oil. CV 5160 is a 60-mole % cationic Q-9 Polyacrylamide 40% Active Emulsion in Oil. CV 5180 is a 80-mole % cationic Q-9 Polyacrylamide 40% Active Emulsion in Oil. CV 5140 is a 40-mole % cationic Q-9 Polyacrylamide 40% Active Emulsion in Oil.

CV 6200P is a nonionic Polyacrylamide 40% Active Emulsion in Oil. CV 6230P is a 30-mole % anionic Acrylic Acid Polyacrylamide 40% Active Emulsion in Oil.



FIGURE 10

Test Results - Comparison Tests

TEST	LOCATION	DATE	CHEM/	JAR.	AR TEST MIXING	IXING	RA	V WATE	R SPEC	RAW WATER SPECIFICATIONS	SNC	FINAL	SETTLE	FINAL SETTLED RESULTS	TS+
			PPM "2"	(MIN RAPID F	(MINUTES/RPM) D FLOC, SET	RPM) SETTLE	ALK.	TURB.	TURB. COLOR TOC	TOC UV254	F	TURB.	COLOR	TOC UV254	H
-	Nederland, TX	02/23/99	ACH/Epi 20:1 40 ppm	3/250		15/0	17	47	150	N/A	7.0	9.0	63	N/A	7.1
2	Nederland, TX	02/23/99	ACH/DAD 20:1 45 ppm	3/250	5/30	15/0	1.	47	150	N/A	7.0	3.4	29	N/A	7.2
ε	Nederland, TX	02/23/99	AICI/Epi 20:1 45 ppm	3/250	5/30	15/0	11	47	150	N/A	7.0	3.7	22	N/A	5.3
4	Nederland, TX	02/23/99	AICI/DAD 20:1 40 ppm	3/250	5/30	15/0	11	47	150	N/A	7.0	5.8	56	NA A	5.5
5	Nederland, TX	02/23/99	CV1777 34 ppm	3/250	5/30	15/0	11	47	150	N/A	7.0	0.9	10	ΑX	7.1
9	Hot Springs, AR	03/31/99	ACH/Epi 20:1 5 ppm	1/85	15/8	30/0	20	2	None Visible	N/A	7.2	1.9	None Visible	N/A	7.2
7	Hot Springs, AR	03/31/99	ACH/DAD 20:1 5 ppm	1/85	15/8	30/0	20	2	None Visible	N/A	7.2	2.2	None Visible	N/A A/N	7.2
89	Hot Springs, AR	03/31/99	AICI/Epi 20:1 11 ppm	1/85	15/8	30/0	20	2	None Visible	N/A	7.2	2.6	None Visible	NA	6.8
6	Hot Springs, AR	03/31/99	AICI/DAD 20:1 11 ppm	1/85	15/8	30/0	20	2	None Visible	N/A	7.2	2.8	None Visible	NA A	6.8
10	Hot Springs, AR	03/31/99	CV1787 6 ppm	1/85	15/8	30/0	20	2	None Visible	N/A	7.2	0.7	None Visible	N V V	7.3

. Best Results of dosage curve.

Dosages are on a mass basis. Products are 40 to 50 percent active. For dosages on an active basis, conversions must be made.

DADMAC is 20% active with a viscosity of 20 cps which correlates to a molecular weight of 250,000. Epi-DMA is 50% active with a viscosity of 150 cps which correlates to a molecular weight of 300,000.

5. ACH is 50 percent active. AICl₃ is 50% active.



FIGURE 11

Test Results - Comparison Testing

TEST	LOCATION	DATE	CHEM/	JAR	JAR TEST MIXING	MIXING	RAW	/ WATE	RAW WATER SPECIFICATIONS	FICATION	SNC	FINAL	FINAL SETTLED RESULTS	D RESUL	TS
			Mdd			_	ALK.	TURB.	TURB. COLOR TOC	T 0C	H	TURB.	COLOR	TOC	F
			"2"	RAPID	FLOC.	SETTLE	PPM	NTO	HACH	UV254		NTO	HACH	UV254	
			ACH/Epi	3/20	1.5/4										
~	Marshall, TX	02/18/99	20:1	1/100	0	10/0	18	7	130	0.40	6.0	1.0	9	107	6.2
			35 ppm		2/20							:)	<u> </u>	!
			ACH/DAD	3/20	1.5/4										
7	Marshall, TX	02/18/99	20:1	1/100	0	10/0	8	-	130	0.40	0.9	6.	20	¥.	5.9
			30 ppm		5/20		•			!		·))
			AICI/Epi	3/50	1.5/4										
က	Marshall, TX	02/18/99	20:1	1/100	0	10/0	9	7	130	0.4	0.9	1.7	24	0.16	4.5
			35 ppm		15/20								, 		
,			AICI/DAD	9/20	1.5/4										
4	Marshall, TX	02/18/99	20:1	1/100	0	10/0	<u>&</u>	=	130	0.4	0.9	2.1	22	0.16	4.3
			35 ppm		15/20										
			CV1703	3/50	1 5/4		1								
2	Marshall. TX	02/18/99	19 ppm	1/100	5	10/0	~ ~	-	130	4	٥	2	ď	90	4
					15/20)	2	=	3	r	2	- -	>	00.0	- - -
			ACH/Epi		15/30										Ī
ဖ	Longview, TX	03/30/99	20:1	.6/80	20/20	10/0	77	7	101	Α N	8.9	3.4	8	Ν	6.9
			8 ppm												
ı			ACH/DAD		15/30	!									
_	Longview, 1X	03/30/99	ZU:1	08/9.	20/20	10/0	2	7	5	¥ Z	8.8	 1.	98	¥ X	6.9
			AICI/Eni		15/30								417		
80	Longview, TX	03/30/99	20:1	.6/80	20/20	10/0	7	2	101	A/N	89	12	Z 00.0	A/N	0
			12 ppm)	!	Sample) ;
			AICI/DAD		15/30										
თ 	Longview, TX	66/06/60	20:1	08/9	20/20	10/0	7	7	5	٨	8.9	6.7	73	¥	5.9
			12 ppm							i					
,	i		CV1725		15/30										
10	Longview, TX	03/30/99	8 ppm	.6/80	20/20	10/0	21	2	101	N/A	6.8	0.3	15	ΑN	7.0
1 Best	Rest Results of dosage curve	97117													

Best Results of dosage curve.

Dosages are on a mass basis. Products are 40 to 50 percent active. For dosages on an active basis, conversions must be made.

DADMAC is 20% active with a viscosity of 20 cps which correlates to a molecular weight of 200,000.

Epi-DMA is 50% active with a viscosity of 150 cps/which correlates to a molecular weight of 300,000.